D4

16. (Thrice Amended) The recombinant gene according to claim 15, wherein the gene encoding an anti-bacterial peptide is a gene encoding an anti-bacterial peptide [derived] from [the] a Diptera insect.

D5

20. (Thrice Amended) A transgenic plant which confers resistance to pathogenic fungi and bacteria, comprising a gene encoding a peptide which has anti-fungal and anti-bacterial activity, with the proviso that the peptide is not atacin, lysozyme, and cecropin.

REMARKS

Claims 1-20 are pending in the present application. In the Office Action, the Examiner has rejected claims 1-3, 5-13, 15, 16, and 18-20 for allegedly lacking written description and enablement. Claims 5-20 stand rejected for allegedly being indefinite. Claims 1-5, 10 and 20 stand rejected for allegedly being anticipated by the Jaynes *et al.* (U.S. Patent No. 5,597,945). Claims 1, 2, and 20 stand rejected for allegedly being anticipated by the Broekaert *et al.* (U.S. Patent No. 5,538,525). Claims 1-20 stand rejected for allegedly being obvious over the prior art and alleged admissions in the present application. Finally, claims 1-4 and 20 were rejected under 35 USC § 101 for allegedly being directed to non-statutory subject matter. Each of the outstanding rejections will be addressed below, in the order in which they were raised.

Information Disclosure Statement

The Examiner's comments relating to the required additional information regarding certain prior art references are noted. Applicants are preparing a revise IDS, which will be submitted shortly.

Rejections under 35 U.S.C. §112, first paragraph

Written Description

In the Office Action, claims 1-3, 5-13, 15, 16, and 18-20 stand rejected under 35 U.S.C. §112, first paragraph, for allegedly lacking written description. In particular, the Examiner alleges that the claimed genus of anti-bacterial genes has not been described in the

manner required by *University of California v. Eli Lilly* 43 USPQ2d 1398 (Fed. Cir. 1997). Applicants respectfully traverse this rejection.

The decision in *University of California* dealt with the question of whether the particular disclosure at issue there was sufficient to support a claim to a large genus of nucleic acid molecules. The claims at issue in this case, however, are based, at least in part on the surprising discovery that anti-bacterial genes can be used to confer anti-fungal properties on transgenic plants comprising them. Thus, the present invention is not directed to the discovery of a new class of nucleic acid molecules (as was the case in *University of California*), but to the use of known nucleic acids in a novel and non-obvious way. Thus, the particular gene used in the invention is not a critical aspect of the invention. Applicants respectfully submit that the holding *In re Herschler* 200 USPQ 711 (CCPA 1979) is more appropriate to analyze the present claims. In that case the court specifically held that rejections for undue breadth and lack of written description relating to non-inventive aspects of a claim are improper. *In re Herschler* dealt with claims to the use of dimethyl sulfoxide (DMSO) to enhance tissue penetration of physiologically active steroidal agents. The claims were directed to the delivery of all physiologically active steroids while the specification provided only a single example demonstrating the efficacy of the claimed methods. The court reversed the Patent Office's rejection of these claims reasoning that, because the invention was not the discovery of novel steroidal agents but the delivery of the agents in combination with DMSO, explicit disclosure of all steroidal agents was not required under §112, first paragraph.

Similarly, in the present case, the claimed invention is not the discovery of particular anti-bacterial genes, but the discovery of novel methods of using them to confer desirable traits on plants. Based on this case law, it is clear that Applicants need not provide sequence information for other anti-bacterial genes to properly support the claims. In light of the clear guidance provided by the court on this issue, this rejection is improper and should be withdrawn.

Enablement

Claims 1-3, 5-13, 15, 16, and 18-20 stand rejected under 35 U.S.C. §112, first paragraph, for allegedly lacking enablement. As in the previous Office Actions, the Examiner

acknowledges that the application is enabling for production and use of recombinant constructs comprising the sarcotoxin1a gene.

As explained previously, the first paragraph of §112, has never been interpreted to require specific demonstration of particular embodiments of an invention. In the present case, applicants respectfully submit that the Examiner has again failed to provide sufficient evidence or reasoning to explain why one of skill could not practice the claimed invention using the present specification and standard techniques. The Examiner states that "undue trial and error experimentation would be required to screen through the vast number of cDNA and genomic clones ..." (page 4, lines 5-6 of the Official Action).

The Examiner argues that in the absence of specific information about the structure of other anti-bacterial genes one of skill would have difficulty in identifying genes useful in the invention. Those skilled in the art would simply need to look for a gene which is either known to, or expected (*e.g.*, through sequence comparison with a known anti-bacterial gene) to code for an anti-bacterial peptide, confirm the anti-bacterial activity of the peptide, if necessary, and then transform a plant with such a gene to rate the anti-pathogenic traits of the resulting transformant. Routine screens to identify other genes which provide the same function within the scope of the claims were well known at the time of the invention. All of these processes would be performed by applying routine techniques available as of the priority date of the subject application.

Indeed, the Examiner acknowledges that "methods for identification of other anti-bacterial genes are known in the art" (first paragraph of page 4 of the Office Action). Surprisingly, the Examiner goes on to assert that the methods of testing a gene for anti-bacterial activity would be "undue trial and error experimentation". The Examiner provides no evidence to show why such screening would be other than merely routine, although laborious, experimentation. The case law is clear that in the biotechnology art that routine screening of even large numbers of samples is not undue experimentation when a reasonable probability of success exists. *In re Wands,* 8 U.S.P.Q.2d 1400 (Fed. Cir. 1988).

As pointed out previously, applicants presented specific evidence in the form of the Epple *et al.*, publication demonstrating that such genes could have been identified using standard screening techniques. In particular, this reference shows that a transgenic plant

conferred with resistance to fungi was produced by the same procedure. In response, the Examiner points out that the particular gene (thionin) described by Epple *et al.* is not disclosed in the present application. In fact, the Epple *et al.* article discloses the fact that the anti-microbial activity of thionins was well known in the art (see page 509, right column, lines 11-15). Thus, one of skill armed with the knowledge of the present specification that anti-bacterial genes can be used to confer resistance to other pathogens and the fact that thionin has anti-bacterial properties would be able to practice the claimed invention. Moreover, as noted above, the invention is not dependent upon the discovery of any particular antibacterial gene, but on the discovery of a new use for these genes. Thus, in light of the case law cited above, the fact that the thionin gene is not disclosed in the present application is simply irrelevant to the question of whether the full scope of the claims is enabled by the specification.

In light of the above, applicants believe the present specification meets all the requirements of 35 U.S.C. § 112, first paragraph. The rejection of the pending claims is therefore improper and should be withdrawn.

Rejections under 35 U.S.C. §112, second paragraph

Claims 5-20 were rejected for allegedly being indefinite. In response, the term "gene" in claims 1, 5 and 12, has be changed to "DNA sequence", essentially as suggested by the Examiner. Claim 16 has been amended as suggested by the Examiner, but claim 17 has not because the term "the Diptera Insect" in claim 17 has antecedent basis in claim 16. Withdrawal of the rejections is respectfully requested.

Rejections under 35 U.S.C. §102(e)

The rejection of claims 1-5, 10, and 20 for allegedly being anticipated by Jaynes *et al.* is respectfully traversed. As noted previously, the present invention is based, at least in part, on the discovery that genes that encode anti-bacterial peptides can be used in plants to confer anti-fungal properties. Jaynes *et al.* simply discloses anti-microbial peptides, but teaches nothing regarding whether these peptides would be useful in conferring resistance to fungal pathogens. The Examiner alleges that this patent also teaches that the peptides have anti-fungal properties. In fact, Examples 11, 14, and 15 in the Jaynes *et al.* patent are prophetic and provide no actual results upon which one of skill could reasonably conclude that anti-

fungal properties can be obtained. The subject application, in contrast, shows that transgenic plants with anti-fungal activity were actually produced and confirmed to exhibit this activity (see Examples 5 and 6).

In apparent recognition of fact that Jaynes *et al.* does not disclose anti-fungal properties of the plants, the Examiner asserts at the end of the rejection that this reference ***inherently*** discloses anti-fungal activity. This is ***not*** true. In fact, not all of the plants transformed with an anti-bacterial gene necessarily express anti-fungal properties. This can be understood by analysis of Examples 8 and 9 in the present specification which show that not all transgenic plants have anti-fungal properties. This point is also clear upon comparison of these examples with the disclosure of the same assignee's earlier-filed Japanese application, Japanese Laid-Open Patent Publication No. 7-250685. Specifically, the data in Example 6 of the 7-250685 publication shows that by using the same anti-bacterial gene, i.e., Sarcotoxin la gene, transformed plants with anti-bacterial properties are obtained (a partial translation of Japanese Laid-Open Patent Publication No. 7-250685 was filed with the Information Disclosure Statement dated May 15, 1997). Thus, the Examiner's assumption of the inherency of the anti-fungal properties is unfounded.

The rejection of the claims for allegedly being anticipated by Broekaert *et al.* is also respectfully traversed. The Examiner has identified nothing in this patent that discloses or suggests this invention. Rather the Examiner simply asserts that the patent inherently discloses the anti-fungal properties of anti-bacterial proteins. As explained above, such an argument is not persuasive because not all transgenic plants comprising antibacterial proteins have these properties.

Rejections under 35 U.S.C. §103

Claims 1-20 stand rejected for allegedly being obvious over the above references and alleged admissions in the present application. This rejection is respectfully traversed.

Applicants respectfully remind the Examiner that a *prima facie* case of obviousness requires that the combination of the cited art, taken with general knowledge in the field, must provide all of the elements of the claimed invention. Moreover, to support an obviousness rejection, the cited references must provide motivation to make the claimed

invention and provide a reasonable expectation of success. *In re Vaeck*, 20 USPQ2d 1438 (Fed. Cir. 1991), citing *In re Dow Chemical Co.*, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988). Applicants explain below, that the Examiner has failed to make his *prima facie* case because there has been no showing of what would motivate one of skill to combine the cited reference in the manner suggested. Nor has there been a showing that one of skill would have a reasonable expectation of success.

In the Office Action, the Examiner cites language from the specification indicating that certain elements of the claimed invention were known (*e.g.* the hinge region of the tobacco chitinase gene , and the PR-1 promoter). The Examiner simply alleges that because these elements were "well known in the art", one of skill would be motivated to combine them in the manner suggested. The Examiner identifies nothing in the art to support this proposition. Shinshi *et al.*, which discloses the chitinase hinge region, is apparently cited to show a motivation to combine the references. Although Shinshi *et al.* discloses isolation, characterization and sequence information of a tobacco chitinase gene, it simply has named a variable region within the amino acid sequence of the tobacco chitinase as a 'hinge region" (see page 363, left column, lines 2-4, and page 365, left column, lines 4-8) without providing ***any*** further teaching for this region. Shinshi *et al.* simply does not disclose or suggest the use of such a hinge region for recombinant production of a heterologous peptide, and advantages attained therefrom. The Office Action provides no reasoning or evidence that would lead to a different interpretation of this reference.

In the Office Action, the Examiner alleges that applicants must provide evidence of unexpected results using vectors comprising the hinge region. This statement is apparently based on the assumption that a proper showing of *prima facie* obviousness has been made. As explained above, such a showing has not been made. In the absence of reasoning or evidence to show why one of skill would be motivated to make the claimed combination (*i.e.* show *prima facie* obviousness), applicants are under no obligation to establish surprising or unexpected results to establish the non-obviousness of the present invention.

In light of the above, the rejection is improper and should be withdrawn.

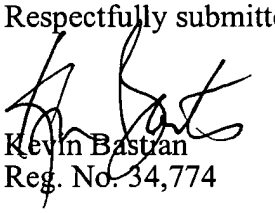
Rejection under 35 U.S.C. §101

The rejection of the claims for allegedly being directed to non-statutory subject matter is overcome by the above amendments in accordance with the Examiner's suggestions.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested. If a telephone conference would expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (415) 576-0200.

Respectfully submitted,



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